TECHNICAL NOTE

A technique for combined hypogastric artery bypass and endovascular repair of complex aortoiliac aneurysms

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Endovascular repair of complex aortoiliac aneurysms may necessitate distal fixation of the endograft to the external iliac artery and percutaneous embolization of the hypogastric artery for prevention of a retrograde endoleak. However, acute interruption of hypogastric perfusion can result in symptoms of pelvic ischemia. We describe a technique in which a prosthetic graft is used as an external iliac artery conduit to facilitate the passage of the endograft delivery catheter/sheath and after completion of the endovascular portion of the procedure, a surgical bypass is completed with anastomosis of the graft to the hypogastric artery. (J Vasc Surg 2002;35:1289-91.)

Approximately 15% to 20% of all abdominal aortic aneurysms (AAAs) are associated with one or more iliac aneurysms.[1] Although the presence of a common iliac aneurysm that involves the iliac bifurcation would ordinarily preclude an endovascular aneurysm repair because of the absence of a suitable distal landing zone, extension of the iliac limb into the external iliac artery with percutaneous embolization of the hypogastric (internal iliac) artery allows an alternative site of distal fixation and successful completion of the procedure. Although the long-term morbidity of acute hypogastric artery occlusion during endovascular aneurysm repair remains controversial, the incidence rate of postoperative ipsilateral hip/buttock claudication, impotence, and colonic ischemia may range from 30% to 40%.[2-4] In this article, we describe a technique for a combined surgical hypogastric artery revascularization and simultaneous endovascular AAA repair, which may help prevent the complications of pelvic ischemia after hypogastric artery occlusion.

OPERATIVE TECHNIQUE

The patient is prepared in the same manner as for a routine endovascular AAA repair. An ipsilateral Gibson's incision is made over the right or left lower quadrant. A completely muscle-sparing approach is used to enter the pelvic retroperitoneal space and expose the iliac bifurcation. The anterior rectus sheath is incised, and the rectus is retracted medially to facilitate exposure. Care should be taken to avoid inadvertent cautery or traction injury to the genitofemoral nerve, which lies just anterior to the adjacent psoas major muscle.

The entire main trunk of the hypogastric artery is exposed for a length of at least 3 cm. Caution must be exercised to avoid injury to the hypogastric-common iliac vein confluence, which runs posterior to the proximal segment of the hypogastric artery. The external iliac artery is similarly mobilized at its mid segment at least 2 cm distal to its origin from the iliac bifurcation. No attempt is made to obtain proximal control of the aneurysmal common iliac artery.

The patient systemically undergoes anticoagulation with heparin. The hypogastric artery is divided and oversewn close to its origin (Fig 1). A large clip is placed just behind this suture line to serve as a radiopaque marker for the iliac bifurcation during the distal deployment of the iliac limb of the endograft. A 10-mm Dacron graft is anastomosed in an end-to-end manner to the distal stump of the hypogastric artery. After completion of the anastomosis, this graft segment is exteriorized through the wound.

Next, the external iliac artery conduit is constructed.[5] To provide an adequate distal landing site for the endograft, it is critical that this is located at least 2 cm distal to the iliac bifurcation. Again, a 10-mm Dacron graft, at least 20-cm long (usually the remnant of the graft used during the hypogastric bypass), is anastomosed in an end-to-side manner to the external iliac artery along its medial aspect with a nonbeveled T-shaped configuration. Anterior rota-

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Competition of interest: nil.

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Fig 1. Proximal stump of hypogastric artery is oversewn.

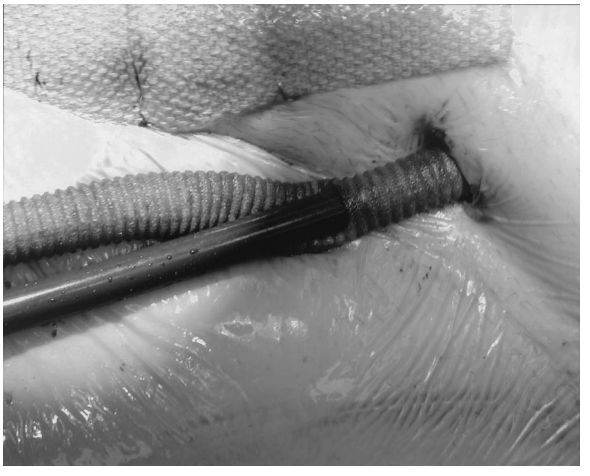

Fig 2. External iliac artery graft is brought out through small separate stab incision to facilitate shallower angle of entry of introducer sheath into artery.

tion of transversely placed arterial clamps facilitates the proper orientation for this medially oriented anastomosis. This serves to prevent twisting of the external iliac artery after the completion of the final anastomosis as described subsequently. A small separate stab incision is made at the level of the inguinal ligament, and the end of this external iliac graft is brought out through this incision and clamped distally (Fig 2). This small counter-incision is positioned so that should femoral exposure be necessary, this same incision may be used and simply extended.

All retractors and sponges are removed, and the retroperitoneum is allowed to fall back in place. The contralateral groin is exposed, and the endovascular procedure is performed with the external iliac graft as a prosthetic arterial conduit. With the distal end occluded, the external iliac artery conduit is pressurized and may be punctured and accessed with sheaths, in a manner similar to the contralateral artery.

Fig 3. Graft-to-graft anastomosis is performed between hypogastric and external iliac artery after conclusion of endovascular AAA repair.

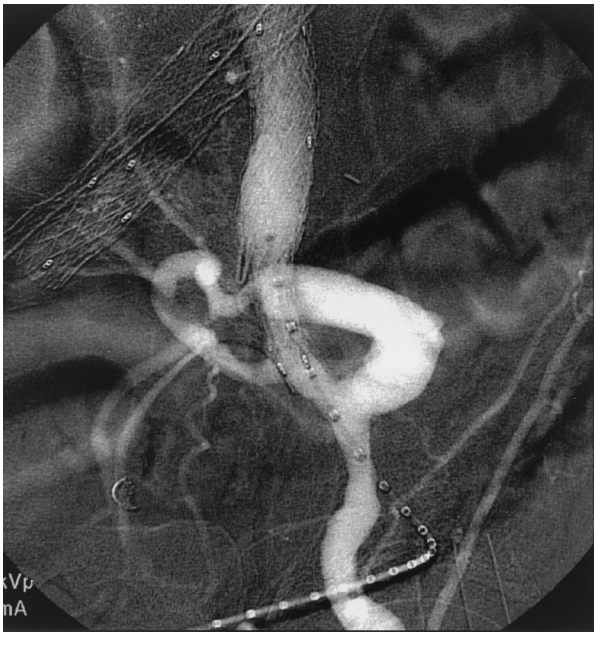

Fig 4. Completion angiogram shows widely patent bypass graft from external iliac to hypogastric artery.

After completion of the endovascular repair, all the sheaths and guidewires are removed. The retroperitoneum is reexposed, and the external iliac artery graft is pulled back from the lower stab incision and into the retroperitoneal field. The hypogastric artery graft and the external iliac grafts are approximated, transected to length, and beveled for a graft-to-graft end-to-end anastomosis. It is important to make the bypass as short as possible to avoid kinking of the anastomosis and early thrombosis (Figs 3 and 4). The retroperitoneal incision is closed routinely.

DISCUSSION

The complications of severe pelvic ischemia can range from significant hip claudication and impotence to colonic ischemia, paraplegia, and buttock necrosis. Although the importance of maintaining perfusion to at least one hypogastric artery is well recognized during surgical aortoiliac reconstruction,[6] this same principle has remained controversial during endovascular AAA repair, with some investigators reporting the relative safety of even bilateral hypogastric artery occlusions.[7,8]

The clinical significance of even unilateral hypogastric artery occlusion during endovascular aneurysm repair has been shown in four recent publications that reported significant rates of postoperative pelvic ischemia ranging from 26% to 41%.[2-4] Indeed, even in the study by Criado et al,[8] which proposed the safety of bilateral hypogastric artery occlusions, 15% of the patients had either erectile dysfunction or buttock claudication that persisted beyond 11 months. Similarly, in the study by Mehta et al,[7] 36% of the patients, who had either unilateral or bilateral hypogastric artery occlusion during endovascular or open AAA repair, had postoperative buttock claudication, which remained in up to 12% of these patients at 1 year.

Parodi and Ferreira[9] have previously reported hypogastric revascularization as a surgical adjunct to endovascular AAA repair.[10] In Parodi and Ferreira's report,[9] they describe two methods for hypogastric artery revascularization, which are sequentially staged by at least a week (ie, bypass first and endovascular AAA repair later), involving either a prosthetic bypass or an external iliac-hypogastric transposition. These procedures were motivated with complications of pelvic ischemia after coil embolization in their own series similar to those reported by other investigators.

Our technique differs in several ways from those reported previously. First, we describe a single method of revascularization that may be applied to a variety of anatomic configurations. And second, the technique involves a simultaneous combined surgical hypogastric revascularization and endovascular repair during the same operative setting. It affords the use of a prosthetic conduit for the passage of the delivery catheter, potentially decreasing the risk of arterial injury especially in cases of tortuosity and occlusive disease, obviates the need for a separate ipsilateral common femoral exposure, and eliminates the risk of a second anesthetic. The technique described here involves three anastomoses versus two. This is because of a final graft-graft anastomosis at the conclusion of the procedure. We adopted this method for three reasons: first, an immediate completion of the bypass would preclude the use of one of the graft sections as a conduit; second, performance of the technically demanding hypogastric end of the bypass is preferable at the beginning of the case than at the conclusion of the endovascular procedure with a single graft segment when it may be compromised with operator fatigue; and finally, a graft-to-graft anastomosis can be relatively simply and rapidly performed.

To date, we have successfully completed this procedure in nine of nine patients who had common iliac artery aneurysms that extended to the iliac bifurcation. The success of this procedure, as with any other endovascular or surgical procedure, is dependent on patient selection. Concomitant hypogastric artery aneurysm, small diameter (<6 mm) hypogastric artery, severe calcification, a short common hypogastric trunk, severe obesity (deep pelvis), previous retroperitoneal surgery, or pelvic irradiation may preclude successful application of this technique. Furthermore, clinical judgment should determine who would benefit from this procedure. Although there currently are insufficient data in the literature to recommend guidelines on who should undergo a hypogastric artery bypass and who should undergo percutaneous coil embolization, in general, we have limited this option to patients who have normal ambulatory capacity (unlimited with angina or dyspnea), compromised contralateral hypogastric perfusion, or evidence of significant hypogastric-mesenteric collateralization.

In summary, we have described a technique of surgical hypogastric revascularization that facilitates the successful endovascular repair of complex AAA in the same operative setting. Inclusion of this technique in the armamentarium of endovascular strategies for AAA repair may allow a greater fraction of anatomic eligibility for patients while reducing the potential sequelae of postoperative pelvic ischemia.

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